

# 100mA / 50V Digital transistors (with built-in resistor)

DTC124TM / DTC124TE / DTC124TUA / DTC124TKA

## ● Applications

Inverter, Interface, Driver

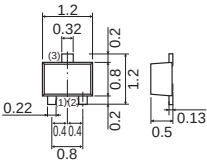
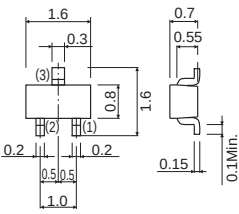
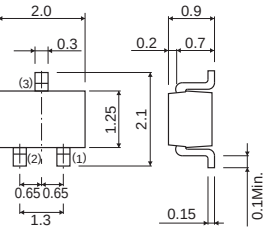
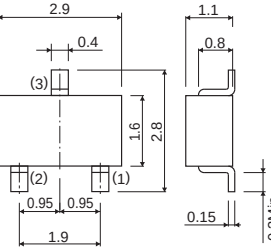
## ● Features

- 1) Built-in bias resistors enable the configuration of an inverter circuit without connecting external input resistors (see equivalent circuit).
- 2) The bias resistors consist of thin-film resistors with complete isolation to allow negative biasing of the input. They also have the advantage of almost completely eliminating parasitic effects.
- 3) Only the on/off conditions need to be set for operation, making the device design easy.

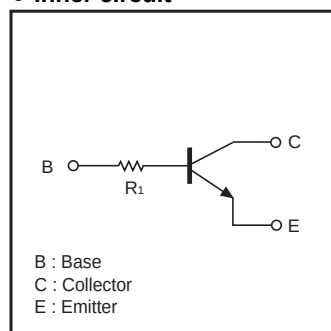
## ● Structure

NPN epitaxial planar silicon transistor (Resistor built-in type)

## ● Dimensions (Unit : mm)

|                                                                                                                                                                                                                                                             |                                                                                                                                                                                                                                                              |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>DTC124TM</p>  <p>ROHM : VMT3<br/>Abbreviated symbol : 05</p> <p>(1) Base<br/>(2) Emitter<br/>(3) Collector</p>                                                        | <p>DTC124TE</p>  <p>ROHM : EMT3<br/>EIAJ : SC-75A<br/>Abbreviated symbol : 05</p> <p>(1) Emitter<br/>(2) Base<br/>(3) Collector</p>                                      |
| <p>DTC124TUA</p>  <p>ROHM : UMT3<br/>EIAJ : SC-70<br/>Abbreviated symbol : 05</p> <p>(1) Emitter<br/>(2) Base<br/>(3) Collector</p> <p>Each lead has same dimensions</p> | <p>DTC124TKA</p>  <p>ROHM : SMT3<br/>EIAJ : SC-59<br/>Abbreviated symbol : 05</p> <p>(1) Emitter<br/>(2) Base<br/>(3) Collector</p> <p>Each lead has same dimensions</p> |

## ● Inner circuit



$R_1 = 22k\Omega$

### ● Packaging specifications

| Part No.  | Package                      | VMT3   | EMT3   | UMT3   | SMT3   |
|-----------|------------------------------|--------|--------|--------|--------|
|           | Packaging type               | Taping | Taping | Taping | Taping |
|           | Code                         | T2L    | TL     | T106   | T146   |
|           | Basic ordering unit (pieces) | 8000   | 3000   | 3000   | 3000   |
| DTC124TM  |                              | ○      | —      | —      | —      |
| DTC124TE  |                              | —      | ○      | —      | —      |
| DTC124TUA |                              | —      | —      | ○      | —      |
| DTC124TKA |                              | —      | —      | —      | ○      |

### ● Absolute maximum ratings (Ta=25°C)

| Parameter                   | Symbol           | Limits      |          |           |           | Unit |
|-----------------------------|------------------|-------------|----------|-----------|-----------|------|
|                             |                  | DTC124TM    | DTC124TE | DTC124TUA | DTC124TKA |      |
| Collector-base voltage      | V <sub>CBO</sub> | 50          |          |           |           | V    |
| Collector-emitter voltage   | V <sub>CEO</sub> | 50          |          |           |           | V    |
| Emitter-base voltage        | V <sub>EBO</sub> | 5           |          |           |           | V    |
| Collector current           | I <sub>C</sub>   | 100         |          |           |           | mA   |
| Collector power dissipation | P <sub>C</sub>   | 150         |          | 200       |           | mW   |
| Junction temperature        | T <sub>J</sub>   | 150         |          |           |           | °C   |
| Storage temperature         | T <sub>stg</sub> | −55 to +150 |          |           |           | °C   |

### ● Electrical characteristics (Ta=25°C)

| Parameter                            | Symbol        | Min. | Typ. | Max. | Unit       | Conditions                       |
|--------------------------------------|---------------|------|------|------|------------|----------------------------------|
| Collector-base breakdown voltage     | $BV_{CB0}$    | 50   | —    | —    | V          | $I_C=50\mu A$                    |
| Collector-emitter breakdown voltage  | $BV_{CE0}$    | 50   | —    | —    | V          | $I_C=1mA$                        |
| Emitter-base breakdown voltage       | $BV_{EB0}$    | 5    | —    | —    | V          | $I_E=50\mu A$                    |
| Collector cutoff current             | $I_{CBO}$     | —    | —    | 0.5  | $\mu A$    | $V_{CB}=50V$                     |
| Emitter cutoff current               | $I_{EBO}$     | —    | —    | 0.5  | $\mu A$    | $V_{EB}=4V$                      |
| Collector-emitter saturation voltage | $V_{CE(sat)}$ | —    | —    | 0.3  | V          | $I_C/I_B=5mA/0.5mA$              |
| DC current transfer ratio            | $h_{FE}$      | 100  | 250  | 600  | —          | $V_{CE}=5V, I_C=1mA$             |
| Input resistance                     | $R_1$         | 15.4 | 22   | 28.6 | k $\Omega$ | —                                |
| Transition frequency                 | $f_T$ *       | —    | 250  | —    | MHz        | $V_{CE}=10V, I_E=-5mA, f=100MHz$ |

\* Characteristics of built-in transistor

### ● Electrical characteristic curves

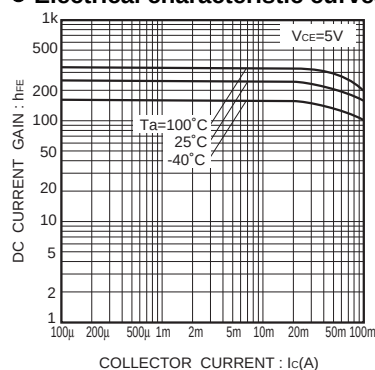


Fig.1 DC current gain vs. collector current

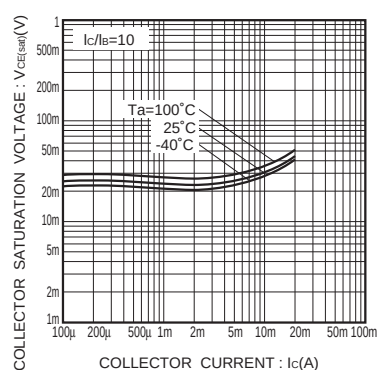


Fig.2 Collector-emitter saturation voltage vs. collector current

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